Higher performance and lower cost optical DPSK receiver

Completed Technology Project (2012 - 2013)

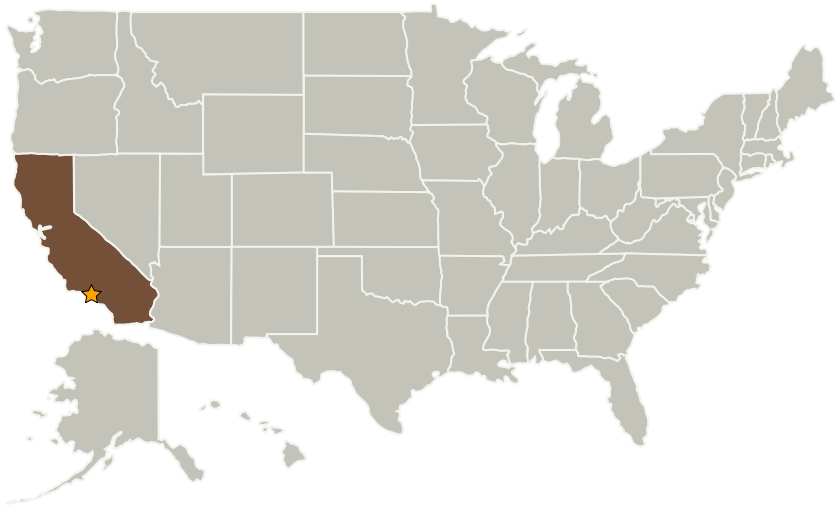
Project Introduction

To demonstrate (benchtop experiment) a DPSK receiver with a free-space interferometer, showing that fiber-optic coupling, associated adaptive optics, and optical preamplification can be avoided, with potential large cost savings; To rigorously quantify the performance (capacity and photon-budget) tradeoff between conventional (adaptive optics + optical preamplification) systems and our proposed free-space photon-counting-array approach; To develop extensions to orthogonal phase-modulated signaling over multiple symbols and associated photon-counting receiver structures, which enable approaching the photon efficiency of high-order pulse position modulation.

Anticipated Benefits

Results from a successful bench-top demonstration would enable infusion into near-Earth and terrestrial communication links in development that utilize DPSK modulation (e.g., NASA LCRD, DARPA FOENEX, other DoD applications). Removing requirement for AO would provide a significant reduction in cost of a DPSK system, putting JPL at a competitive advantage in bidding for free-space DPSK. Successful implementation of multiple-symbol phase-shift-keying would represent a breakthrough in practical implementation of low duty-cycle modulations, providing performance and SWAP gains.

Primary U.S. Work Locations and Key Partners



Higher performance and lower cost optical DPSK receiver

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Innovation Fund: JPL CIF

Center Innovation Fund: JPL CIF

Higher performance and lower cost optical DPSK receiver

Completed Technology Project (2012 - 2013)

Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Project Management

Program Director:
Michael R Lapointe

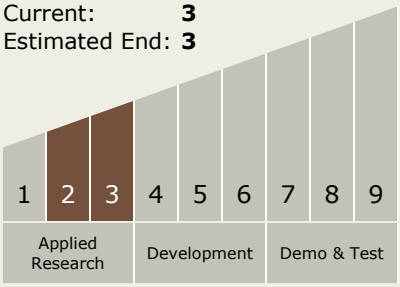
Program Manager:
Fred Y Hadaegh

Project Manager:
Jonas Zmuidzinas

Principal Investigator:
Baris I Erkmen

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.5 Revolutionary Communications Technologies
    - TX05.5.1 Cognitive Networking